

IN THE UNITED STATES DISTRICT COURT

DISTRICT OF UTAH, CENTRAL DIVISION

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UNITED STATES OF AMERICA,

Plaintiff,

v.

THOMAS JAMES ZAJAC,

Defendant.

**MEMORANDUM DECISION  
AND ORDER  
RE: TRACE EVIDENCE**

Case No. 2:06-cr-00811 CW

Judge Clark Waddoups

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**INTRODUCTION**

This matter is before the court on Defendant Thomas James Zajac's motion to limit the testimony on trace evidence. Zajac is charged with bombing the Salt Lake City Public Library in 2006. A *Daubert* hearing was held on March 1, 2010 through March 4, 2010 during which testimony was taken from Amy Michaud ("Michaud") and Michelle Evans ("Evans") regarding trace evidence found at the library bombing. Briefing on trace evidence was completed on June 14, 2010 and the court heard oral argument on July 26, 2010. The court grants in part and denies in part Zajac's motion to limit the scope of their testimony.

**FACTUAL BACKGROUND**

**Michaud's Testimony**

For the last five years, Michaud has worked for the Bureau of Alcohol, Tobacco, Firearms and Explosives ("ATF") as a forensic chemist.<sup>1</sup> She has, however, twenty-one years of experience working in trace evidence.<sup>2</sup> Zajac does not challenge Michaud's qualifications as a trace evidence

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<sup>1</sup> Hr. Tr., 415:23–416:1 (Docket No. 372).

<sup>2</sup> *Id.* at 416:15–16.

expert.<sup>3</sup>

With a stereomicroscope,<sup>4</sup> Michaud visually examined over 100 items of trace evidence in this case.<sup>5</sup> Of this number, she did a further analysis on 37 items.<sup>6</sup> Her testimony at the *Daubert* hearing, however, was focused on her analysis of adhesives that were used in constructing the Salt Lake City device and those found at Zajac's residence.<sup>7</sup> An "adhesive" is "any material that can be used to hold two surfaces together."<sup>8</sup> Michaud "removed some white adhesive from the thread" of a metal pipe found at the bomb scene.<sup>9</sup> She also found white adhesive on a timer.<sup>10</sup> She compared the adhesive from those objects with adhesives found at Zajac's residence and found that the adhesive on the pipe and timer is consistent with a "tube of GE silicone sealant" found at Zajac's residence.<sup>11</sup> It also is consistent with "some white adhesive that was found on a 9-volt battery . . . and a pair of pliers from Mr. Zajac's residence."<sup>12</sup> By "consistent," Michaud meant that the

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<sup>3</sup> Def's Memo. to Exclude Expert Witness Testimony Regarding Trace Evidence Analysis at Trial Pursuant to *Daubert*, 4 (Docket No. 344) (hereinafter "Def's Memo. to Exclude Trace Evid.").

<sup>4</sup> A stereomicroscope "gives you a three-dimensional perception of what you're looking at microscopically." Hr. Tr., 438:8–10 (Docket No. 372).

<sup>5</sup> *Id.* at 424:23–24.

<sup>6</sup> *Id.* at 424:24–25.

<sup>7</sup> *Id.* at 424:16–20.

<sup>8</sup> *Id.* at 421:20–21.

<sup>9</sup> *Id.* at 426:2–7.

<sup>10</sup> *Id.* at 427:18–23.

<sup>11</sup> *Id.* at 426:7–16, 427:22–428:2.

<sup>12</sup> *Id.* at 426:16–19.

adhesives are “consistent in appearance, chemical composition, and elemental composition, and they could have come from the same source.”<sup>13</sup>

Michaud also examined a gold, bubbly adhesive found on the device.<sup>14</sup> It, too, is consistent visually, chemically, and elementally with a container of Gorilla Glue found at Zajac’s residence.<sup>15</sup> Thus, she opined the gold, bubbly adhesive on the device could have come from Zajac’s particular container of Gorilla Glue.<sup>16</sup>

To make this determination, Michaud did four tests. First, she did a visual examination, as mentioned above. During a visual examination, she looks at color, texture, opacity, and “the elasticity of the adhesive.”<sup>17</sup> If the samples are consistent, she then looks at their chemical composition with a Fourier Transform Infrared Spectrometer (“FTIR”).<sup>18</sup> If the samples are consistent chemically, she proceeds to look at their elemental composition through a scanning electronic microscope energy dispersive x-ray spectrometer (“SEM EDS”).<sup>19</sup> If the samples are consistent elementally, she again checks the chemical composition through a different “instrument called a pyrolysis gas chromatograph mass spectrometer.”<sup>20</sup> If the tests show consistency throughout,

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<sup>13</sup> *Id.* at 426:23–25.

<sup>14</sup> *Id.* at 427:1–3

<sup>15</sup> *Id.* at 427:7–17.

<sup>16</sup> *Id.* at 427:16–17.

<sup>17</sup> *Id.* at 422:22–24.

<sup>18</sup> *Id.* at 422:24–423:4.

<sup>19</sup> *Id.* at 423:5–10.

<sup>20</sup> *Id.* at 423:11–17.

she concludes “that they could have come from the same source.”<sup>21</sup> She followed these same steps to reach her conclusion in this case.

Michaud is required to take a proficiency test on each instrument she uses in the lab and on each type of polymer she analyzes.<sup>22</sup> “Polymer is a large molecule that is made up of repeating structural units . . . that can be either manmade” or natural.<sup>23</sup> It is “a very broad category,” that includes adhesives.<sup>24</sup> Michaud has been found proficient in analyzing adhesives. Moreover, she takes a test each year to re-certify her proficiency.<sup>25</sup> Although she did not know of an error rate with the methods she uses, they have been peer reviewed and achieved general acceptance in the relevant community.<sup>26</sup> Zajac does not challenge the instrumentation, nor the validity of the specific tests that were conducted.

Zajac does contend, however, that insufficient testing was done to determine consistency among the adhesives. The tube of silicone found at Zajac’s home “had not gone through any curing process.”<sup>27</sup> Michaud, therefore, placed an amount “on a glass microscope slide and allowed it to dry so that it was in a similar form to the adhesive on the bomb remnants.”<sup>28</sup> Because she did not know the humidity or temperature at which the adhesive on the device cured, she did not attempt to control

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<sup>21</sup> *Id.* at 423:18–23.

<sup>22</sup> *Id.* at 429:21–430:5.

<sup>23</sup> *Id.* at 421:9–14.

<sup>24</sup> *Id.* at 421:12–17.

<sup>25</sup> *Id.* at 430:9–11.

<sup>26</sup> *Id.* at 430:22–432:16.

<sup>27</sup> Hr. Tr., 478:5–7 (Docket No. 373).

<sup>28</sup> *Id.* at 478:17–22.

for this when she cured the sample on the slide.<sup>29</sup>

The Gorilla Glue taken from Zajac's home also was not cured, and the FTIR showed a different peak between the adhesive on the device and the adhesive taken from Zajac's home.<sup>30</sup> To determine if heat and moisture would alter the peak, Michaud cured a sample by placing it in an oven with some water.<sup>31</sup> When she cured the sample, the peak became consistent with that found on the device, and she then proceeded with the remainder of the tests.<sup>32</sup> Because Michaud has done no studies about the different rates of polymerization when temperature and moisture are varied, Zajac contends that Michaud cannot opine that the adhesives on the device are consistent with the adhesives found at Zajac's home.<sup>33</sup>

Zajac also challenges Michaud's conclusion that the adhesives found on the device and those found at Zajac's home could have been from the same source. Michaud testified that "adhesives are mass produced, meaning that they're made with a recipe and sometimes in large batches."<sup>34</sup> Because one batch can yield many bottles, "there are likely other bottles out there that could be exactly the

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<sup>29</sup> See *id.* at 481:21–25.

<sup>30</sup> See *id.* at 488:18–21, 489:15–17.

<sup>31</sup> *Id.* at 488:18–489:3.

<sup>32</sup> *Id.* at 491:24–492:13.

<sup>33</sup> Zajac called Frederic Whitehurst ("Whitehurst") to testify to rebut Michaud and Evans' testimony. Whitehurst has extensive experience in forensic analytical chemistry. He testified he had no issues with the techniques Michaud used to analyze the adhesives. Hr. Tr., 701:20–25 (Docket No. 374). The instrumentation Michaud used are well-accepted and widely used. *Id.* at 701:25–702:9. Whitehurst noted, however, that there have not been validation studies done on the materials at issue. *Id.* at 702–705. Without the validation studies, he opined that one cannot know the details that are being missed by the instrumentation. *Id.*

<sup>34</sup> Hr. Tr., 422:3–5 (Docket No. 372).

same as” those found at Zajac’s home.<sup>35</sup> Hence, when Machaud concluded that the adhesives could have come from the same source, it “also means that it could have come from a different [source].”<sup>36</sup>

### **Evans’ Testimony**

For ten years, Evans has worked for the Bureau of Alcohol, Tobacco, Firearms and Explosives (“ATF”) as a forensic chemist.<sup>37</sup> Prior to working for ATF, Evans worked for the National Institute of Standards and Technology for two years, during which time she obtained a master of science degree in forensic science.<sup>38</sup> Zajac does not challenge Evans’ qualifications as a trace evidence expert.<sup>39</sup>

In Evans’ position, “along with looking for the explosives and doing the chemical analysis, [she is] also identifying the components that are present as part of the device.”<sup>40</sup> Evans testified she was asked to do the same in this case.<sup>41</sup> At a bomb scene, an investigator uses a vacuum filter, which “is an evidence collection technique” that collects matter from an area and traps it in the filter.<sup>42</sup> The filter is then capped, sealed, and sent to the laboratory.<sup>43</sup> Evans was sent several vacuum filters in

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<sup>35</sup> Hr. Tr., 505:18–506:11 (Docket No. 373).

<sup>36</sup> *Id.* at 495:7–23, 504:9–21.

<sup>37</sup> *Id.* at 508:6–14.

<sup>38</sup> *Id.* at 508:18–509:4.

<sup>39</sup> Def’s Memo. to Exclude Trace Evid., 6 (Docket No. 344).

<sup>40</sup> Hr. Tr., 511:16–19 (Docket No. 373).

<sup>41</sup> *Id.* at 514:1–2; *see also id.* at 541:12–13 (stating “A lot of what I did was just document what I found”).

<sup>42</sup> *Id.* at 516:18–25.

<sup>43</sup> *Id.* at 516:25–517:2.

this case.<sup>44</sup> After opening the filters, she visually examined the contents, and did a microscopic exam.<sup>45</sup> Afterwards, she determined what items needed further analysis.<sup>46</sup> Evans “found double-base smokeless powder” with “fragments of blue identifier.”<sup>47</sup> During the *Daubert* hearing, Evans walked through each of the steps she took to identify the powder.

Among other things, Evans also testified that she “found fragments of a pyrotechnic fuse.”<sup>48</sup> A tool located at Zajac’s residence had “residue of green lacquer,” which Evans found “was consistent with that from a pyrotechnic fuse.”<sup>49</sup> She provided no testimony, however, about why it was consistent. On cross-examination, the following exchange occurred:

Q: Now during direct, you were asked questions about this green lacquer material?

A: Yes, I was.

Q: And your testimony was that it was consistent with a fuse?

A: I believe that is correct.

Q: But you didn’t testify about whether it was visually consistent or elementally consistent or chemically consistent at all, fair to say?

A: Yes, that is correct.<sup>50</sup>

No additional information about the green lacquer was elicited on cross-examination or re-direct.

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<sup>44</sup> *Id.* at 517:6–518:5.

<sup>45</sup> *Id.* at 518:8–10.

<sup>46</sup> *Id.* at 518:11–12.

<sup>47</sup> *Id.* at 518:17–18.

<sup>48</sup> *Id.* at 541:25–542:1.

<sup>49</sup> *Id.* at 542:8–10.

<sup>50</sup> *Id.* at 582:7–16.

Evans further testified about “alligator clips with black rubbery covers.”<sup>51</sup> The following exchange occurred on direct examination:

Q: Now, there was also an alligator clip and black rubbery cover that was found in the Salt Lake City device. . . . Is that true?

A: . . . I know what you’re referring to, yes.

Q: Were there any alligator clips with black rubbery covers uncovered in the search warrant of Mr. Zajac’s home?

A: Yes, there were.

Q: Did you make a comparison?

A: It was difficult to because *I could do a visual comparison of the alligator clips*, but *I couldn’t do a full comparison of the rubber covers* because the rubbery cover in the I believe in the Salt Lake City device had lost its shine. And so, you know, our first step when we do a comparison is we do a visual exam and if there is a difference, then we kind of have to stop there. It is difficult to lay any value or weight to something that is visually different. It doesn’t matter if [it is] chemically the same, if they’re visually different then we can’t make a conclusion.<sup>52</sup>

On cross-examination, Evans provided the following additional testimony about the alligator clips:

Q: So let’s talk about the various opinions that you have provided to the court. With regard to the alligator clips, is it fair to say that you are not in a position to render an opinion in this case concerning the alligator clips with the rubber covers?

A: . . . I do remember the rubber covers that I was not able to make any conclusion about those because they were visually different.

Q: So in this case, you’re not going to render an opinion about those alligator clips, fair to say?

A: I don’t know about the other alligator clips specifically but I remember the covers. So I could look at my report, if you wanted me to, for the alligator

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<sup>51</sup> *Id.* at 542:17–19.

<sup>52</sup> *Id.* at 542:11–543:6 (emphasis added).



clips.

Q: You can look at your report. My question is, in this case will you be rendering an opinion at all about alligator clips?

A: The only opinion that I can make is that they were visually consistent and that meant that I looked at them and took measurements, but I did not perform any chemical analysis on them.<sup>53</sup>

For purposes of the *Daubert* hearing, Zajac seeks to exclude Evans' testimony that the green lacquer on the tool found at Zajac's residence was consistent with that from a pyrotechnic fuse.<sup>54</sup> Zajac also seeks to exclude Evans' testimony about any visual comparison between the alligator clips found at the bomb scene and those found at Zajac's home.<sup>55</sup>

## **ANALYSIS**

### **I. STANDARD FOR ADMISSIBILITY OF EXPERT TESTIMONY**

Rule 702 of the Federal Rules of Evidence specifies that if an expert's opinion "will assist the trier of fact to understand the evidence or to determine a fact in issue," that expert may testify "if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case."<sup>56</sup>

The Rules of Evidence have a "liberal thrust,"<sup>57</sup> such that there is a "strong and undeniable

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<sup>53</sup> *Id.* at 568:14–569:10.

<sup>54</sup> Def's Memo. to Exclude Trace Evid., 6 (Docket No. 344).

<sup>55</sup> *Id.*

<sup>56</sup> Fed. R. Evid. 702.

<sup>57</sup> *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 588 (1993).

preference for admitting any evidence having some potential for assisting the trier of fact.”<sup>58</sup> Thus, “rejection of expert testimony has been the exception rather than the rule.”<sup>59</sup> Instead, “[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof” are the appropriate means for attacking admissible evidence.<sup>60</sup> The government, nevertheless, bears the burden of establishing by preponderance of the evidence that Michaud and Evans’ testimony is admissible because it is the proponent of the testimony.<sup>61</sup>

## II. MICHAUD’S TESTIMONY

### A. Consistency

For purposes of the *Daubert* hearing, Zajac does not contest the following: (1) Michaud’s qualifications as an expert; (2) Michaud’s determination that white silicone and Gorilla Glue were found on the bomb remnants; and (3) Michaud’s determination that white silicone and Gorilla Glue were found at Zajac’s residence in tubes and on certain objects.<sup>62</sup> Zajac seeks to exclude, however, Michaud’s testimony that she found consistency<sup>63</sup> between the adhesives on the bomb remnants and those at Zajac’s home because Michaud did not conduct enough tests about polymerization.

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<sup>58</sup> *United States v. Velasquez*, 64 F.3d 844, 849 (3d Cir. 1995) (quotation marks and citation omitted).

<sup>59</sup> *Ruff v. Ensign-Bickford Indus., Inc.*, 171 F. Supp. 2d 1226, 1232 (D. Utah 2001) (citing *Goebel v. Denver & Rio Grand W. R.R. Co.*, 215 F.3d 1083, 1089 (10th Cir. 2000)).

<sup>60</sup> *Daubert*, 509 U.S. at 596.

<sup>61</sup> *Ralston v. Smith & Nephew Richards, Inc.*, 275 F.3d 965, 970 n.4 (10th Cir. 2001) (citations omitted).

<sup>62</sup> Def’s Memo. to Exclude Trace Evid., 4–5 (Docket No. 344).

<sup>63</sup> Zajac does not specify which “consistency” opinion he seeks to exclude. Zajac’s challenge appears to go more towards chemical and elemental, rather than visual, but the court presumes Zajac seeks to exclude all testimony about consistency.

During the *Daubert* hearing, Zajac referenced a recent study done by the National Academy of Sciences (“NAS Study”). The NAS Study found problems with current forensic science standards in many areas.<sup>64</sup> When discussing examination of paint and coatings evidence, however, it noted that it “requires microscopic and instrumental techniques and methods,” and “follows an analytical process.”<sup>65</sup> It further noted that “[e]xaminers involved with the analysis of paint evidence in the laboratory typically possess an extensive scientific background, because many of the methods and analyses rely heavily on chemistry.”<sup>66</sup> In summing up its assessment, the study stated “analysis of paints and coatings is based on a solid foundation of chemistry to enable class identification.”<sup>67</sup>

While this case pertains to adhesives rather than paints, both are polymers that require microscopic examination, instrumental techniques and methods, and scientific knowledge for proper identification. Thus, the NAS Study is instructive here and lends support to the efficacy of Michaud’s tests. Moreover, in *Daubert*, the Supreme Court stated the following:

The subject of an expert’s testimony must be “scientific . . . knowledge.” The adjective “scientific” implies a grounding in the methods and procedures of science. Similarly, the word “knowledge” connotes more than subjective belief or unsupported speculation. . . . Of course, it would be unreasonable to conclude that the subject of scientific testimony must be “known” to a certainty; arguably, there are no certainties in science.<sup>68</sup>

In other words, the test for admissibility is not that Michaud had to conduct every

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<sup>64</sup> National Research Council of the National Academies, *Strengthening Forensic Science in the United States, A Path Forward* (2009).

<sup>65</sup> *Id.* at 168.

<sup>66</sup> *Id.*

<sup>67</sup> *Id.* at 170.

<sup>68</sup> *Daubert*, 509 U.S. at 589–90 (1993) (citations and footnote omitted).

conceivable test to determine consistency and absolute certainty. Instead, her tests had to be reliable rather than merely subjective and speculative. Michaud used four different instruments to determine consistency. While Michaud's tests may not go to the level of specificity that Zajac desires, even Whitehurst testified that the tests she performed are well-accepted and widely used. *Duabert* does not require a validation study on every single compound tested through these instruments. The instruments were designed to analyze many compounds and there is no evidence before the court that Michaud misapplied techniques or methods when she conducted her analysis. Consequently, the court concludes that the tests Michaud performed are both reliable and probative. The court further concludes that the tests were sufficient for Michaud to be able to opine on the visual, chemical, and elemental consistency between the adhesives on the Salt Lake City device and those found at Zajac's residence.

## **B. Source**

Zajac also seeks to exclude Michaud's opinion that the adhesives could have come from the same source. As Michaud testified, she is not opining that the adhesives found on the bomb remnants came from the containers at Zajac's residence to the exclusion of all others. She acknowledges there likely are many containers that are consistent with the adhesives found at Zajac's residence. Because of the consistency, though, it is possible that they came from the same source. While this fact may be true, it is also possible that they could have come from different sources.

Because Michaud is an expert in polymers, the jury may have a "tendency to give undue weight" to her testimony.<sup>69</sup> If she were permitted to opine that the adhesives could have come from the same source, there is an undue risk of prejudice that a jury will conclude they did come from the

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<sup>69</sup> *United States v. Rodriguez-Berrios*, 573 F.3d 55, 72 (1st Cir. 2009).

same source without fully considering that it is just as likely the adhesives came of a different source. Therefore, pursuant to Rule 403, the court concludes that Michaud may not state her final conclusion that the adhesives could have come from the same source.

### **III. EVANS' TESTIMONY**

#### **A. Green Lacquer**

As stated above, Evans testified that the green lacquer on the tool found at Zajac's residence was consistent with that from a pyrotechnic fuse. This is the ultimate conclusion that Evans reached, but the court was provided with no evidence as to how Evans reached this conclusion. To determine if "an expert's testimony is reliable, the trial judge must assess the reasoning and methodology underlying the expert's opinion."<sup>70</sup> The government bore the burden of establishing "that the method employed by the expert in reaching the conclusion is scientifically sound and that the opinion is based on facts which satisfy Rule 702's reliability requirements."<sup>71</sup>

Here, Evans testified in general terms about how she conducts an analysis. She uses a number of different instruments, which vary based on the type of analysis she is doing.<sup>72</sup> Evans testified at length about the particular instruments she used to identify double-base, blue dot smokeless powder. In contrast, she did not list one instrument or method that she used to find consistency between the green lacquer on the tool and the pyrotechnic fuse. Nor does the court have any information as to the type of consistency that she found. Hence, the court does not know if the green lacquer was visually, chemically, or elementally consistent. Consequently, the court cannot

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<sup>70</sup> *United States v. Lopez-Hodgson*, 333 Fed. Appx. 347, 353 (10th Cir. 2009) (citation omitted).

<sup>71</sup> *Id.*

<sup>72</sup> *See* Hr. Tr., 512:9–13 (Docket No. 373).

assess the reasoning and methodology underlying Evans' opinion. The court, therefore, excludes Evans' testimony that the green lacquer was consistent with the pyrotechnic fuse.<sup>73</sup>

## **B. Alligator Clips and Rubber Covers**

Zajac contends the court must exclude Evans' testimony about any consistency between the alligator clips from the Salt Lake City device and those found in Zajac's home. He does so on the basis that Evans "could not reach a conclusion as to whether the alligator clip covers were consistent with each other because the pieces of evidence were not visually consistent enough to warrant continued testing."<sup>74</sup> While it is accurate that Evans formed no conclusion about the alligator clip covers, a close reading of her testimony shows that she did find visual consistency between the alligator clips, themselves, excluding the covers. She testified that she visually examined the clips, took measurements, took photographs, noted special features on them, and found them visually consistent.<sup>75</sup> Although the visual examination did not "require a special degree or special class," it did require one "who is trained to know what to look for, to note comparisons."<sup>76</sup>

Evans further testified that when doing a visual comparison, if there are differences between the objects, she stops her examination at that point. That she held to this methodology is shown by

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<sup>73</sup> The tool with the green lacquer was found in conjunction with an investigation of the Salt Lake City case and other cases. *Id.* at 581:3–9. The ruling in this memorandum decision and order only applies to evidence pertaining to the Salt Lake City bombing. In other words, Evans may not testify that the green lacquer on the tool was consistent with the pyrotechnic fuse on the Salt Lake City device. The court makes no determination about whether the tool will be admissible for other purposes because that was not before the court at the *Daubert* hearing.

<sup>74</sup> Def's Reply Memo. to Exclude Trace Evid., 5–6 (Docket No. 366) (quotation marks and citation omitted).

<sup>75</sup> Hr. Tr., 569:7–18 (Docket No. 569).

<sup>76</sup> *Id.* at 569:18–21.


the fact that she stopped her examination of the black rubbery covers as soon as she noted that the cover from the Salt Lake City device had lost its shine. Based on her complete testimony, the court concludes that Evans had sufficient data on which to determine visual consistency between the alligator clips (excluding the covers), that her opinion was based on reliable principles and methods, and that she properly applied those principles and methods in forming her conclusion. Accordingly, while Evans may not opine about the black rubbery *covers*, she can testify about the consistency between the alligator *clips*.<sup>77</sup>

### **CONCLUSION**

For the reasons stated above, the court grants in part and denies in part Zajac's motion to exclude trace evidence. Michaud may testify about the consistency between the adhesives found on the Salt Lake City device and those found at Zajac's residence, but she may not testify that the adhesives could have come from the same source. Evans may testify about the consistency between the alligator clips found at the Salt Lake City bombing and those found at Zajac's residence, but she may not testify about the black rubbery covers or the green lacquer as they pertain to the Salt Lake City bombing.

DATED this 2<sup>d</sup> day of September, 2010.

BY THE COURT:

  
Clark Waddoups  
United States District Judge

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<sup>77</sup> Zajac, of course, may challenge this opinion during cross-examination.